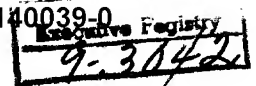


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UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON



A handwritten signature in ink, appearing to be "C. E. Murray".

April 29, 1957

Mr. Allen W. Dulles
CIA
2430 E Street, N. W.
Washington, D. C.

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nuclear weapons programs.

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interest, I have requested that a copy be
sent to you.

Very sincerely,

A handwritten signature in ink, appearing to be "T. E. Murray".

Thomas E. Murray

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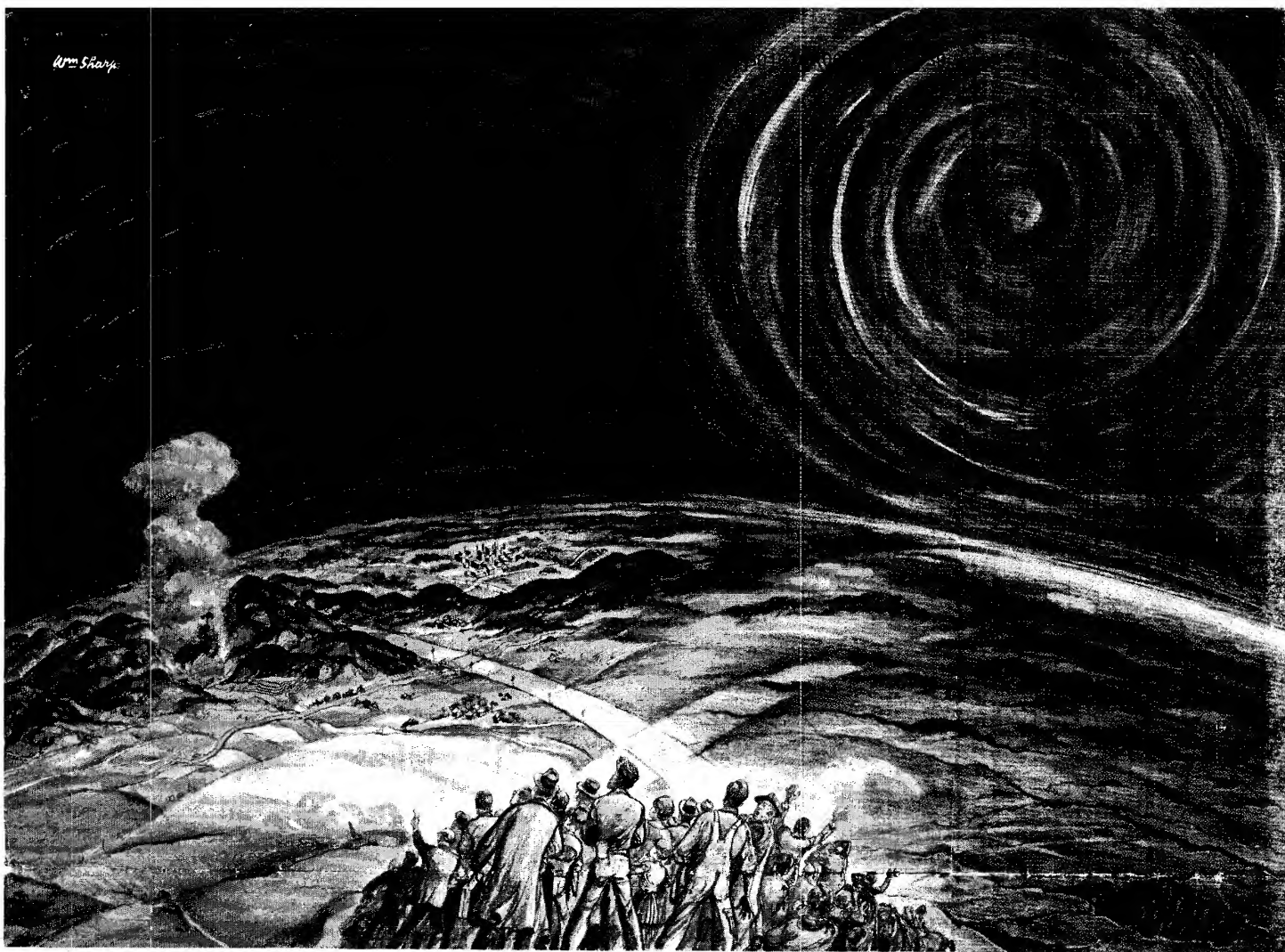
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Because of your special interest in the subject matter and the author, proofs are enclosed of an important article appearing in the May 6th issue of LIFE by A.E.C. Commissioner Thomas E. Murray. Entitled, "Reliance on H-Bomb and Its Dangers", the article by Mr. Murray makes a forthright contribution to what he calls the control issue of our time: the military uses of nuclear energy.

Editorial Services Department

43-113

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THE GREAT ALTERNATIVES that confront U.S. and American people, as author sees them, are either to rely entirely on huge force of H-bomb (right) as

deterrent to major war, or to prepare for minor wars as well by making small nuclear weapons (left) which can hit specific targets and limit area of devastation.

RELIANCE ON H-BOMB AND ITS DANGERS

AEC official argues for smaller nuclear arms to avoid 'slow defeat'

by THOMAS E. MURRAY

THE recent British White Paper on Defense dramatically thrust into the forum of public argument the central issue of our times—the military uses of nuclear energy. It also defined the major focus of argument in this sentence: "The free world is today mainly dependent for its protection upon the nuclear capacity of the U.S."

Will the U.S. be strong enough to assume the staggering burden thus quietly imposed upon it? Are we moving, with sufficient sureness and speed, toward the development of a nuclear capacity that will be adequate in all respects for the protection of the free world? These are the grave questions that have now been opened to public discussion. I shall argue that the structure of our defense policies needs revision if we are to discharge successfully the full range of military responsibilities that we now bear.

The protection of the free world absolutely demands that two dangers be avoided. One danger is the so-called "war of survival," waged

with the immense new thermonuclear weapons. It is altogether possible, as I shall explain, that no nation would survive such a war. In order to avoid this danger the U.S. has hitherto laid heavy emphasis on the production of megaton bombs. The hope has been that this air-nuclear-retaliatory capacity will deter an enemy attack massive enough to launch us into a "war of survival."

However, this heavy emphasis on megaton bombs has itself created the second danger, namely, the possibility of piecemeal defeat at the hands of international Communism. We know that the enemy has made hydrogen bombs. We must suppose he has a megaton stockpile. The umbrella of a nuclear stalemate has been raised over the earth. For all we know, the enemy may have assisted in raising the umbrella precisely in order to provide a cover for a program of cautious aggression. In any case, we can be sure that in the perilous safety of its shade he will continue to act according to his nature, as a criminal

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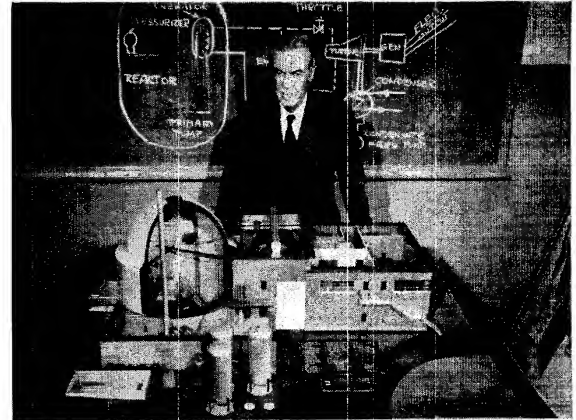
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THE AUTHOR

Atomic Energy Commissioner Thomas E. Murray, shown above with a nuclear reactor model, is a distinguished financier and electrical engineer who holds some 200 patents on his inventions. Before his appointment in 1950 he served as an executive in banking, transit, public utilities and manufacturing firms.

NUCLEAR ARMS PLAN CONTINUED

outlaw. It is not likely that his outlawry will be so outrageous as to pull down the umbrella upon himself and upon us in a common ruin. But there will be "minor" outrages, as there have been. Since megaton bombs are designed only for desperate uses, the danger is that in moments of "minor" outrage our only recourse will be to moral indignation.

That is to say, we shall be defeated, on each successive occasion when a "minor" aggression occurs, as in Hungary. Moral indignation is no substitute for the ability to protect by force the decencies of human life. Whatever the value of the big umbrella, we urgently need to have that decent, nicely calculated measure of nuclear force, valid as a threat and valid in use, which will deter or halt the "minor" aggressions of an enemy who in the ultimate instance will yield to no other suasion than force.

Sudden destruction or slow defeat—both of these alternatives must be ruled out with all the certainty that human prudence can achieve. The ruin of the physical fabric of civilization is too awesome a prospect to contemplate. Even more intolerable is the prospect of enforced submission to the injustice of creeping Communist domination. The problem is to find the path of policy that will lead us between these dreadful alternatives.

The presently prevailing policy of emphasis on megaton weapons may have saved us from sudden destruction—so far. But if we are to avoid the risk of slow defeat, we now need a new policy of emphasis on small nuclear weapons. The urgent demand of the moment is for a program of rational nuclear armament. I have been using this phrase to describe a structure of policies that will result in a stockpile that exhibits a properly adjusted balance between large and small nuclear weapons—all manufactured with an eye to their military usefulness, as these are calculated in the light of Communist military intentions.

A path to 'peace with justice'

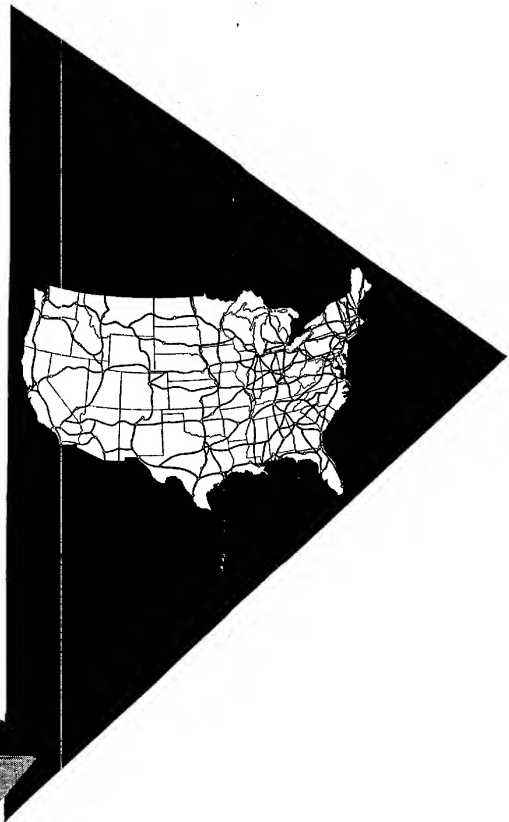
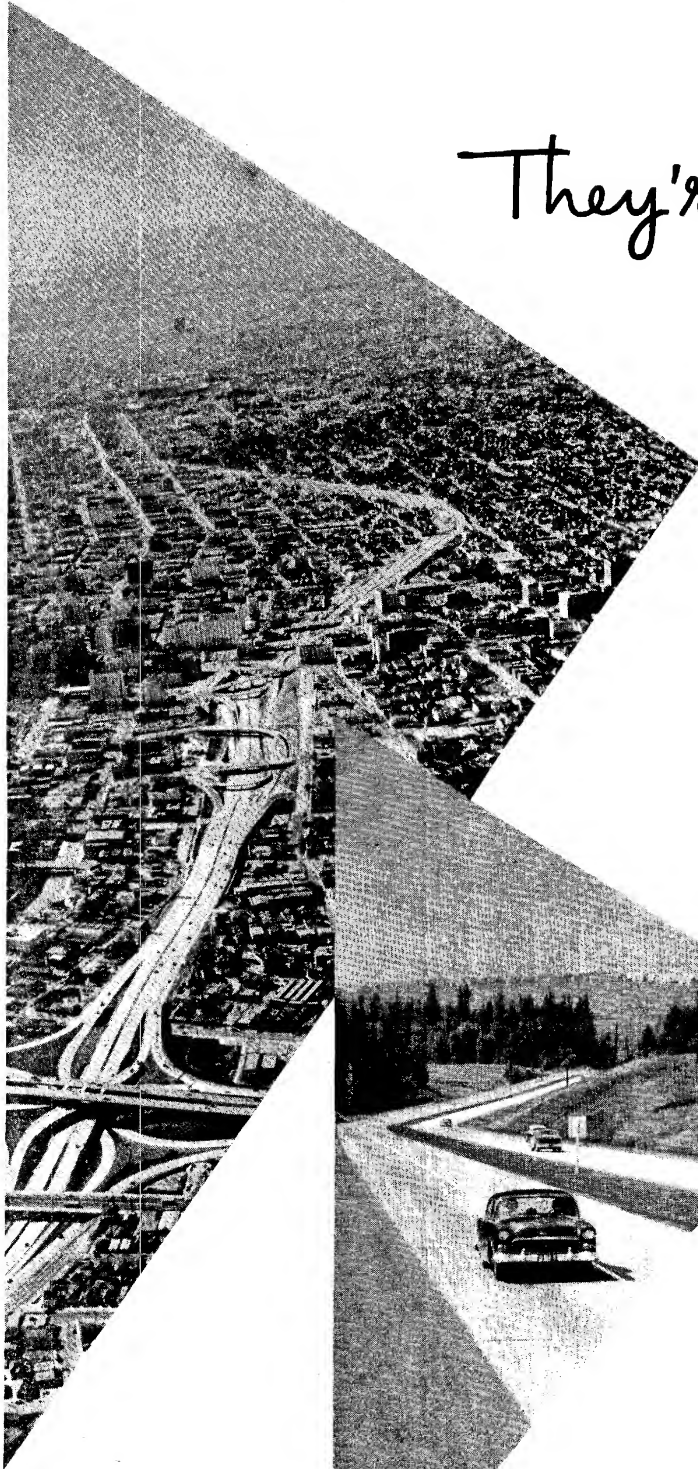
ADMITTEDLY, perils lurk on both sides of the path of military and moral reason to which I am pointing. Nonetheless, though the path is lined with perils, at least it is not headed straight for them. It can lead us to that measure of military security that may legitimately be hoped for in a world where total security has become a vain dream. Moreover, it can also lead us toward the moral goal described by President Eisenhower in his Second Inaugural—"the building of a peace with justice in a world where moral law prevails."

Four factors have hitherto diverted us from the path of rational nuclear armament.

The first factor was technological. In the whole course of World War II the Allied air forces let loose upon the enemy 1.5 million tons (one and a half megatons) of explosives. After the experiment at Eniwetok in November 1952, we had the secret of a weapon whose explosive force surpassed by many times the total World

CONTINUED

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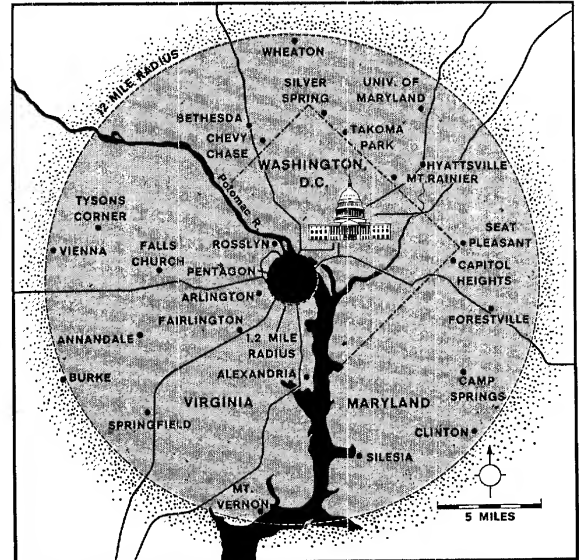
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DAMAGE COMPARISON between hydrogen bomb and a tactical atomic weapon is shown in diagram using Washington, D.C. as example. Effort to knock out Pentagon building (center) with big H-bomb would destroy capital and much of surrounding region—and radioactive fallout (stippled area outside circle) would carry danger still farther. But small A-bomb dropped on same spot would limit destruction to general target area (dark inner circle).

NUCLEAR ARMS PLAN CONTINUED

War II megatonnage. Weapons technology had hit upon an "open end." The realization was quickly reached that there are no necessary practical limits to the megaton-size of H-bombs.

As an engineer, I understand the seduction exerted by a technological "open end." It is the instinct of technology to exploit the maximum possibilities of every discovery. Weapons technology could not have been expected to control its own instinct; the control should have been imposed on it by military policy, which judges the usefulness of weapons.

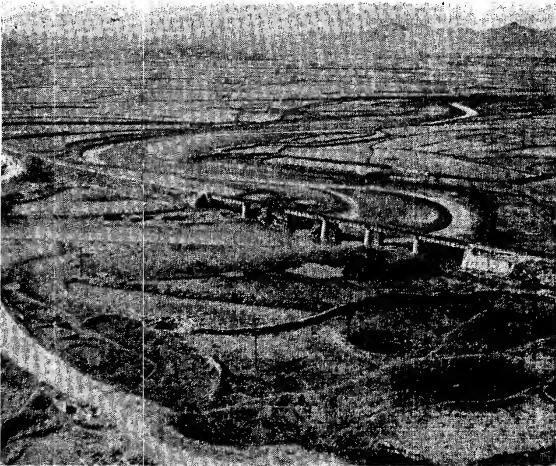
But here the second factor entered. Weapons technology seemed now to have fulfilled the military planner's perennial dream of the irresistible weapon. In particular, the H-bomb seemed to be the ideal weapon with which to justify the doctrine of strategic air attack and thus to furnish warrant for the dominance of the air arm. So it happened that military policy, under the spell of its own dream, fell captive to the technology that seemed to have realized it.

The captivity was reinforced by the third factor—the impact of world events. For instance, Korea made real the threat of Communist world-domination; and it raised the specter of a general war. In response, America had to be made "strong." However, it was not a question of acquiring limited strength for limited wars. Korea created a popular revulsion against the very idea of limited war. A kind of abstract strength was wanted—the kind of "absolute" strength that would match the "supreme" threat of world domination. This abstract strength could now be given very concrete definition in terms of the H-bomb. Further emphasis was thus laid on the production of these "absolute" weapons.

The fourth factor furnished the final emphasis—the powerful factor of costs. The general public is likely to assume that a "big" bomb must cost more than a "small" bomb. Moreover, given the plentiful supply of uranium ore out of which bombs are made, the popular assumption might be that we have by this time manufactured a complete collection of nuclear weapons, adapted to all possible uses—big weapons, and small ones, and middle-sized ones, all stocked and shining on the shelves.

The matter is not so simple. The cost of weapons involves not only money and materials but also a factor called "efficiency" in the use of materials. There is no lack of uranium ore; but there is only a limited number of the plants in which the ore is processed into fissionable materials. Our existent industrial complex for this purpose represents roughly a capital investment of \$6.7 billion. In consequence we have only a limited amount of weapons-making material. Here the factor of "efficiency" enters.

CONTINUED



CONVENTIONAL BOMBS FAILED to knock out enemy bridge in Korea, left only craters of misses. Small nuclear bomb would assure destruction.

NUCLEAR ARMS PLAN CONTINUED

A given quantity of material can be utilized in such a way as to produce a very large explosion. The same quantity of material can also be used in another way, to produce a smaller explosion. If the "efficiency" of a weapon is to be measured in terms of the ratio between the quantity of fissionable material used and the explosive results obtained, it is obvious that the small weapon is less "efficient" than the big one. Consequently, the small weapon is also proportionately more costly, in terms both of material and of dollars.

These four factors, therefore—the technological open end, the dream of the irresistible strategic weapon, the desire for abstract strength, and the factor of costs—have hitherto combined together to weight the scales of policy heavily in favor of the big cheap bomb.

What has been the military value of this emphasis? What military uses are served by these huge weapons, and by the possession of quantities of them? Are there limits to their usefulness? Are there consequently limits to the military value of a constantly enlarging stockpile of them? These are the next questions.

The multimegaton H-bomb was born in a vacuum of military strategy. No one had antecedently determined its uses. After the event the vacuum was filled with confusion. The confusion is not surprising. The multimegaton bomb fits badly, if at all, the standards of military usefulness hitherto accepted. It is by nature a weapon of mass destruction. If you except certain special targets, such as a fleet at sea, it will perform least efficiently against classical military objectives—troops in the field or in reserve, aircraft aloft, supplies, communications. It will destroy airfields, at the price of slaughtering the civilian population in the area. It will be altogether "efficient" in annihilating beyond repair the industrial and human potential of great cities. But this terrible "efficiency" is linked to no reasonable military usefulness. Most theorists today agree that the destruction of industrial potential would make little, if any, sense in a multimegaton war, which would be a war of sudden catastrophe, not of slow attrition.

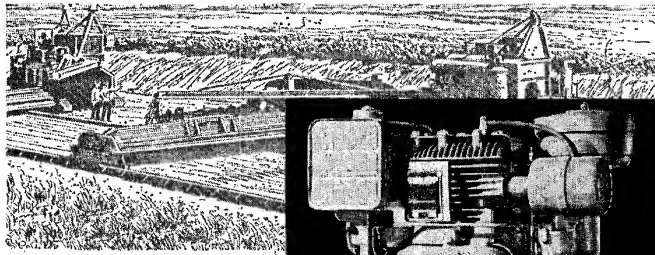
If 'deterrence' should fail

THE multimegaton weapon therefore had to create its own strategy. It is the old strategy of deterrence and retaliation; but now this strategy has all the newness of the new kind of weapon that gives it military substance. The military value of the strategy lies in the intrinsic link between deterrence and retaliation. "These weapons will either deter you or smash you"—so runs the reasoning. If there is any doubt about the intention of pursuing the second alternative if the first fails, the reasoning trails off thus:

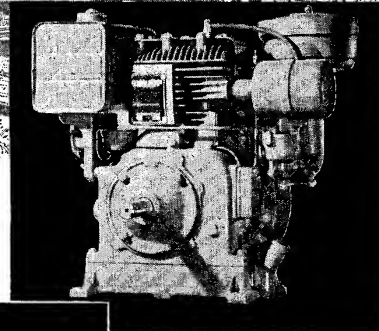
"These weapons will deter you—I hope; if not, you win." But this is the classic formula for a bluff.

America certainly does not wish to rest its national security on a bluff. Therefore the complementary concepts of deterrence and retaliation are a strategy for war. They cannot simply be accounted a strategy for preventing war. The multimegaton weapons in our

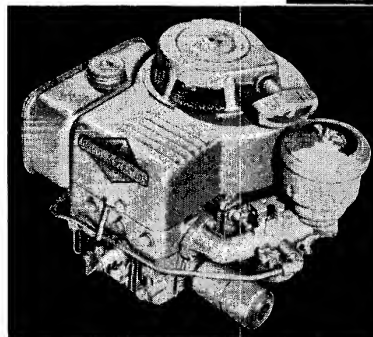
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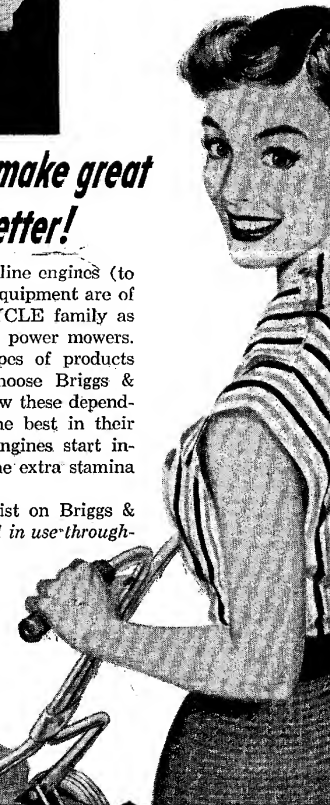
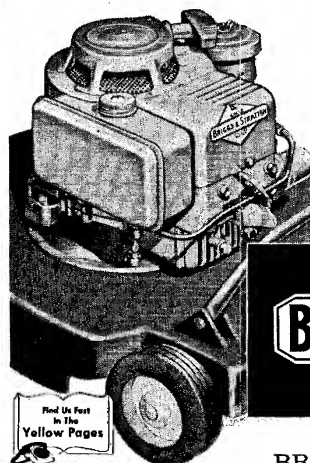


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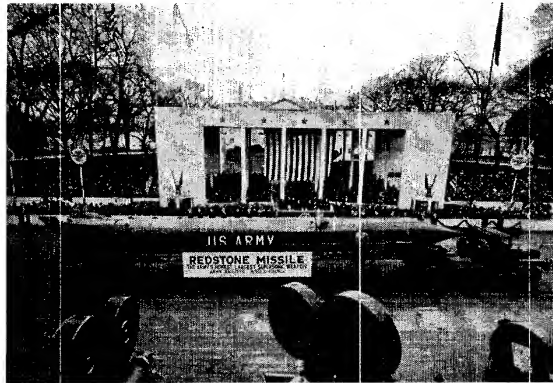


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NUCLEAR ARMS PLAN CONTINUED

arsenal are designed for use. Has anyone defined the conditions of necessity under which they will come into use? I do not know. However, to pursue the argument about their usefulness, I shall assume that the conditions are one day fulfilled. Nuclear deterrence has failed. The Strategic Air Command is unleashed. It represents retaliation by multimegaton weapons, used in quantities, directed at the destruction of the enemy. We are precipitated into the "war of survival."

That is to say, we are hurled into the midst of absurdity. In the whole doctrine and history of war in the civilized world it is a first principle that "survival" should never be made the issue in war. Whenever the principle has been violated (in World Wars I and II) the result has been the climactic disaster of war, namely, the failure of war to achieve its political and moral ends, which are peace with justice. In the air-nuclear age this ancient principle has acquired all the evidence of an axiom. To put the question, who will survive, we or they, to the arbitrament of full-scale nuclear warfare is to decide that nobody shall survive, neither we nor they.

It might be that the belligerents could survive the almost immeasurable physical destruction and colossal loss of life immediately resultant from the blast and fire effects of great thermonuclear weapons used in quantities. It might even be that some of them could survive the effects of what is called external radiation (the immediate radiation from one multimegaton bomb alone will expose the population in approximately 7,000 square miles of territory to dangerous levels of external radiation). But under the conditions of unimaginable horror created by our hypothesis the word "survival" has already lost almost all its meaning. And what little meaning remains vanishes when one comes to what is called internal radiation from substances in the fallout.

One of these substances is strontium-90, a radioactive product of nuclear fission that causes bone cancer if it is absorbed in sufficient quantity by the human skeleton. At the moment, by official American acknowledgment, strontium-90 equivalent to 30 megatons of nuclear fission energy has been shot into the stratosphere as a result of test explosions. From the total quantity sent aloft so far, some three to 10 units of strontium-90 will be deposited in human bones—particularly children's bones—over large areas of the earth.

Absurdity of 'war of survival'

THESE amounts probably are not hazardous to health. But they afford a standard of measurement. The 10 units are 1/10th of the maximum concentration considered acceptable for the general population, with its large numbers of children, by the National Committee on Radiation Protection and Measurement and also by the International Commission on Radiological Protection.

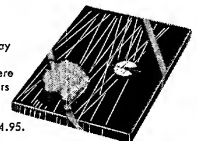
How many megatons would be exploded in a full-scale nuclear "war of survival"? Let us say that ground bursts releasing 3,500 megatons of fission energy would sufficiently fill out the concept of "destruction" that would be the shared aim of both belligerents. The consequence for the inhabitants of the belligerent countries would be a strontium level in human bones of the order of 50 times the maximum considered acceptable. Moreover, some of this lethal substance would settle slowly and relatively evenly



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NUCLEAR ARMS PLAN CONTINUED

over the remainder of the earth. It would find its way from the soil into human bones, producing strontium concentrations that would be between two and six times the maximum considered acceptable for the general population. A whole generation, embracing tens of millions of people, in Russia, in the United States, in all the countries of the world, would be affected.

The figures I have used might have to be altered somewhat with the progress of scientific work. Some variation in the figures does not greatly matter. What matters is that some figures have to be put into the concept, "war of survival," in order to test its realism. And when a set of not unreasonable figures is used, the concept blows apart into patent absurdity.

The inherent absurdity of a multimegaton war sets limits to the military usefulness of immense thermonuclear weapons. In consequence, limits are also set to the validity of the strategy based on these weapons. Deterrence-retaliation may, if you wish, be called a strategy of survival—but only as long as the deterrence works, as long as it sustains the nuclear stalemate.

We must therefore have an arsenal of multimegaton weapons sufficiently large to give the strategy built upon them its own limited kind of validity. But this arsenal need only be a limited one. There is a limit, set by the absurdity of a "war of survival," beyond which these "absolute" weapons become absolutely useless.

The military value of the giant H-bomb is also limited from another point of view. It is not a fit means of retaliation against limited military aggressions supported by conventional or small nuclear arms. Instead of repressing a limited and localized aggression its use would tend to provoke the expansion of hostilities in the direction of that fearsome absurdity, the "war of survival." But these limits, set to its retaliatory value, likewise affect its deterrent value. The strategy of deterrence-retaliation, as given military substance only by multimegaton bombs, is no adequate guarantee of the security of the free world against some military version of Communist "salami tactics."

We come now to a more manageable military problem. There are issues, short of the impossible issue of survival, which may have to be settled by arms. Broadly, they are issues of justice, the classical issues of war. They are always limited issues. And limited war is the legal institution available as a last resort for their settlement. In its political and moral meaning war is man's ultimately resolute declaration of his fixed and firm purpose—that he will have peace indeed but only with justice. What then of our preparedness to wage war, in civilized fashion, for limited aims, by limited means?

A gauge of Soviet intentions

SOME people seem to grow nervous when the question is raised in this form, under reference to justice, reason and the values of the civilized tradition. The trouble is, they say, that the free world faces an immoral enemy. Recently, for instance, Mr. Donald A. Quarles, now Deputy Secretary of Defense, gave warning that "... it would be unwise in planning for the security of our country to rely on the morality or even the rationality of potential enemies. We must still have security even if others resort to immoral and irrational acts. These have always been truisms but the stark facts of this air atomic age give them vastly greater force."

This distorts the whole military and moral question. Obviously it would be absurd to place any reliance on Soviet morality. But the problem is not whether we should rely on Soviet moral cynicism but whether we can diagnose Soviet military intentions. From the fact that the Soviet Union is immoral does it follow that a massive air-nuclear attack upon the U.S. is likely? And how likely is it? And what would "security" mean, if the irrational event were to occur? In terms of the stark facts of the air-atomic age—especially the facts about radioactive fallout—would "security" be achieved by proportionately massive megaton retaliation against the Soviet Union? These are the things we would like to know.

More pertinently, an appeal to the truism that the enemy is immoral will not justify an idolatrous worship of air-nuclear-retaliatory power based on greater numbers of megaton bombs. Similarly, a "war in outer space," waged by nuclear missiles, may be a technological possibility. Is it therefore a military likelihood? And is it more likely than a war on the Turkish border? We cannot aim to be secure against every possible contingency, but only against the more likely contingencies. The problem is to make a realistic calculation of what the immoral enemy is likely to do, and then to have on hand the measure and kind of force that will be militarily necessary or useful in stopping him from doing it. This



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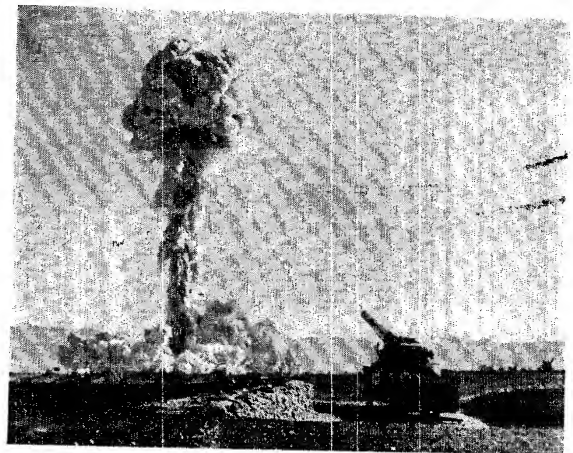
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ATOMIC CANNON, shown in Nevada test, is with U.S. troops in Germany and Okinawa. It may soon be outmoded by newer, more mobile weapons.

NUCLEAR ARMS PLAN CONTINUED

is our military duty; it is likewise our moral duty. Between the two duties there is no divorce.

To assist in performing both duties we have the stark facts of the air-atomic age. We also have the fact that Soviet military policy has a Communist premise, and that Soviet leaders are capable of primitive logic. The premise was stated by Mr. Khrushchev when, speaking with all the seriousness of the Marxist-Leninist faith in the dialectic of history (a faith not born of alcohol nor blurred by it), he said, "We will bury you." I presume that he has no wish to spoil his own pleasure on the occasion by finding himself in the same grave. It is a fair conclusion that he does not intend to dig the grave with several thousand megatons of fission energy.

Do not Soviet scientists know as much as we do about radioactive hazards? Are not Soviet strategists using the criterion of contamination levels in order to test the validity of their strategies of nuclear attack, and also to test the realism of American threats of retaliation? If there are any doubts about affirmative answers to these questions, it would be greatly in our national interest to clear them up as soon as possible.

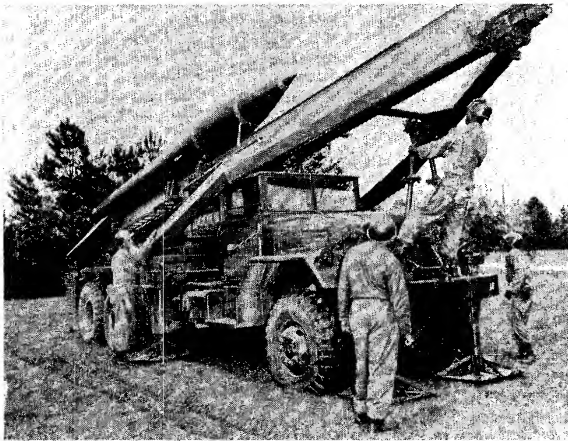
There is therefore a tenet of Communist ideology on which we can rely. The Communist revolution clearly wishes to put an end to the history of imperialist-reactionary-bourgeois capitalism. But it does not wish to put an end to all history—and therefore to the Communist revolution itself. If the Communist believes that the future belongs to him, can he wish to cancel it out? Unless indeed he be not only immoral but altogether mad. And in that case, how do you deter a madman, intent on chaos, by threatening him with the chaos that he wants?

The Communist norm of morality—the success of the revolution—is not civilized. But it affords us a realistic, and safe enough, premise of military policy. From it I would conclude that Communist invasions of the order of right and justice will be limited. The exchange of an unlimited megatonnage of fission energy occupies no visible place in the Communist strategy of world domination. A classless society of bone-cancer patients would hardly satisfy the dreams of Marxist messianism.

Small nuclear weapons needed

OUR central problem therefore is to deter limited aggressions and to retaliate by effective but limited force, if deterrence fails. The question is, what have we got in the way of small nuclear weapons to fulfill this limited military mission of deterrence and retaliation?

There is little public information on this subject. Perhaps, consequently, there is a considerable amount of public misapprehension. The extent to which our rigid security regulations have had the happy result of slowing down Soviet nuclear developments (which in any case they cannot stop) is a matter of conjecture. On the other hand it could be argued that they have had the unhappy result of rendering our nuclear armament program unmanageable by informed and responsible public opinion. Moreover,



"HONEST JOHN" rocket can carry nuclear warhead 15 miles. Shown here during last month's war games in Louisiana, it is in full use by U.S. troops.

NUCLEAR ARMS PLAN CONTINUED

their enforcement at times goes to extremes even within high government circles. For instance, some months ago, I wished to convey certain factual information about the present and future composition of our nuclear stockpile to certain members of the National Security Council. But it was ruled that they had no "need to know" the facts I wished to present.

However, some general information is on record in the press. On Feb. 5, 1957, Senators Symington, Kefauver and Flanders met as a task force of the Senate Armed Services Committee in public session. Frank H. Higgins, an Assistant Secretary of the Army, and Lieut. General Carter B. Magruder, Deputy Chief of Staff for Logistics, appeared before them.

As reported by Joseph L. Myler in the *Washington Daily News*, Mr. Higgins said that the job of equipping the Army with small atomic weapons is "progressing very nicely." But he added that it is "largely a development program still." General Magruder is quoted as agreeing that it will be "three to five years" before the Army has enough tactical atomic weapons to reduce the use of conventional ammunition in war by as much as 25%.

The nuclear weapons spectrum in its full sweep is the support of the "four basic military missions" of the American Armed Forces, defined by President Eisenhower in his budget message of January 1957. Only one of these missions, the first, necessarily calls for a stockpile of multimegaton weapons. This mission is "to maintain ready nuclear-air-retaliatory forces so strong that they will deter a potential aggressor from initiating an attack." The other three missions, for their highest efficiency, rest heavily on a vast arsenal of nuclear weapons in the smaller range. The "tens of thousands" of small weapons which I recommended as necessary or desirable (on April 12, 1956, in testimony before the Subcommittee on Control and Reduction of Armaments of the Senate Foreign Relations Committee) would not exceed the requirements of these three missions—the defense of the continental United States, the waging of ground war by the Army and the control of the seas.

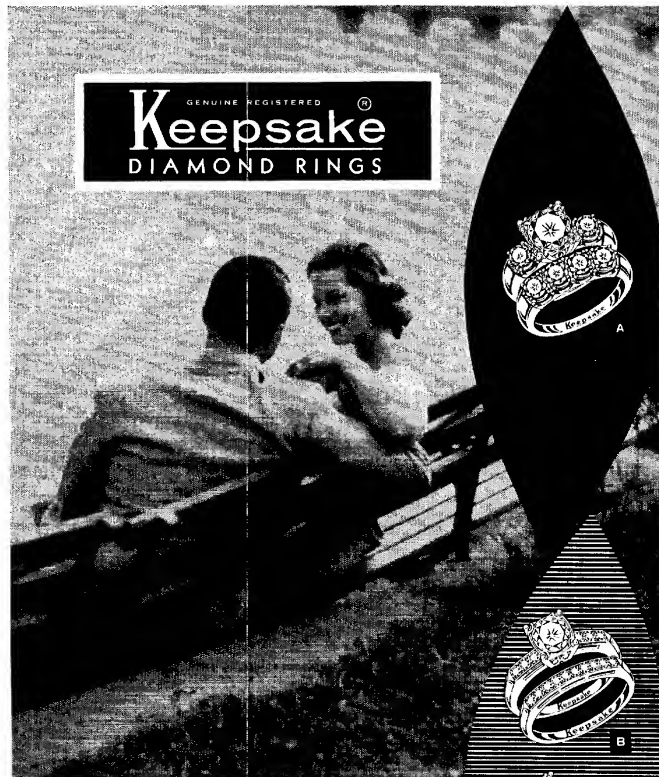
The Armed Forces cannot fulfill these three military missions with a "development program." The immediate need therefore is to move the small-weapons program out of the development phase into the phase of large-scale production.

High cost of small weapons

THIS will be somewhat costly. The major requirement would be more fissionable materials. This in turn would require an expansion of our present industrial facilities. The size of the new investment in plants would depend upon the extent to which the output of our existent plants is directed away from large weapons into the needed small-weapons program. In any case, the money spent would be well spent, if its amount were measured against the demands of military security, and also against the amount now being spent on other defense programs.

If the small-weapons program is to be moved into the large-scale production phase, the first thing needed is some important change

CONTINUED



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NUCLEAR ARMS PLAN CONTINUED

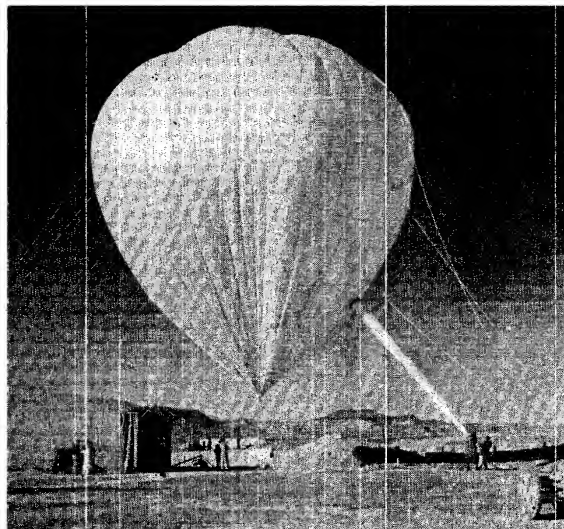
in the sequence and order of our interrelated policies. At present the order is inverted. Military policy has allowed itself to be too greatly determined by technology. And the factor of costs, in alliance with technological factors, has unduly determined the emphasis in the weapons program. But this is to turn the structure of policy upside down.

I do not underestimate the value of technology or the importance of costs. But I do not think that these things should come first in the order of value and importance. Military policy should come first. At present it requires an extensive production program of small weapons. Budgetary policy should be subordinated to effective execution of this military policy. And technology should be the servant and not the master in the military house. The structure of policy should be turned right side up.

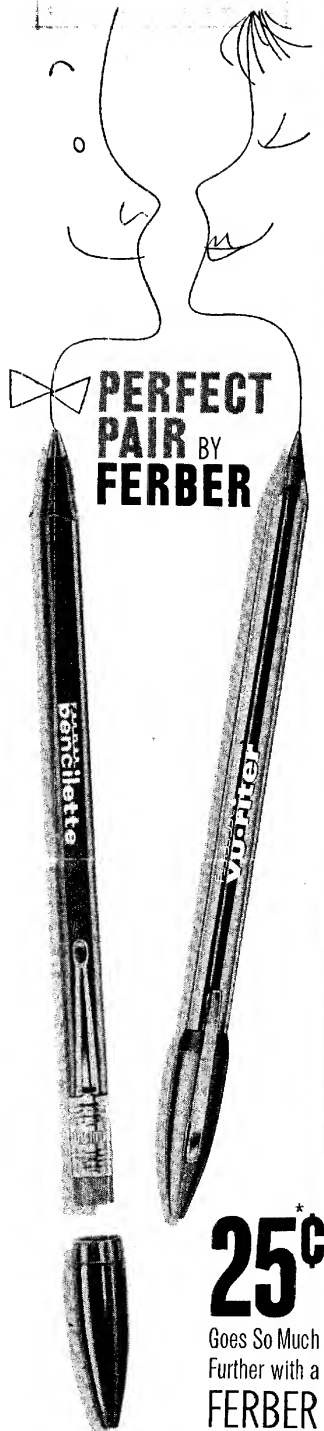
The whole foregoing argument about weapons policies has been cast in pragmatic terms. I have been concerned to uncover policies that will work best for America's security and that of the free world. The problem is a practical one; but it does not therefore cease to be a moral problem. Morality is anchored in reality. Often before this I have argued for the governance of our weapons program by a moral norm ("what is right, in terms of the civilized tradition of just warfare"). But the premise of this moral argument has always been a prior practical argument—that the program should be governed by military values ("what is necessary or useful, in terms of the likely contingencies of actual warfare," within the supposition of responsible military theory—that "military usefulness" is not to be defined in terms of sheer slaughter, destruction and terror).

The military duty of the U.S. is success, in the face of international Communism. But the moral duty of the U.S. is always justice, in the sight of God. There need be no conflict between these two duties. One cannot, of course, say that whatever is just will be successful. But one can say that whatever is not just will somehow fail to succeed. In the matter of nuclear war the validity of the latter assertion is easily tested. The civilized tradition has always declared that an unlimited and indiscriminate use of force in warfare is unjust. The facts of the nuclear age now declare that such a use of force would be unsuccessful. The "success" it would achieve, the sheer destruction it would wreak, would be at best useless to the belligerent and at worst disastrous to humanity.

It is within the factual circumstances of the nuclear age, wherein justice is the duty as well as success, that I make my proposals for a program of "rational nuclear armament." Will this program fulfill God's purpose for the world, to which America has pledged itself—in reverent participation—the building of peace with justice in a world where moral law prevails? That, I believe, is not the question. To the extent that it is Christian this nation knows that it is not required to fulfill God's purposes on this earth. It is only required to be faithful to them.



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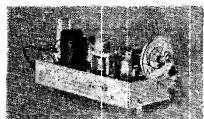
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